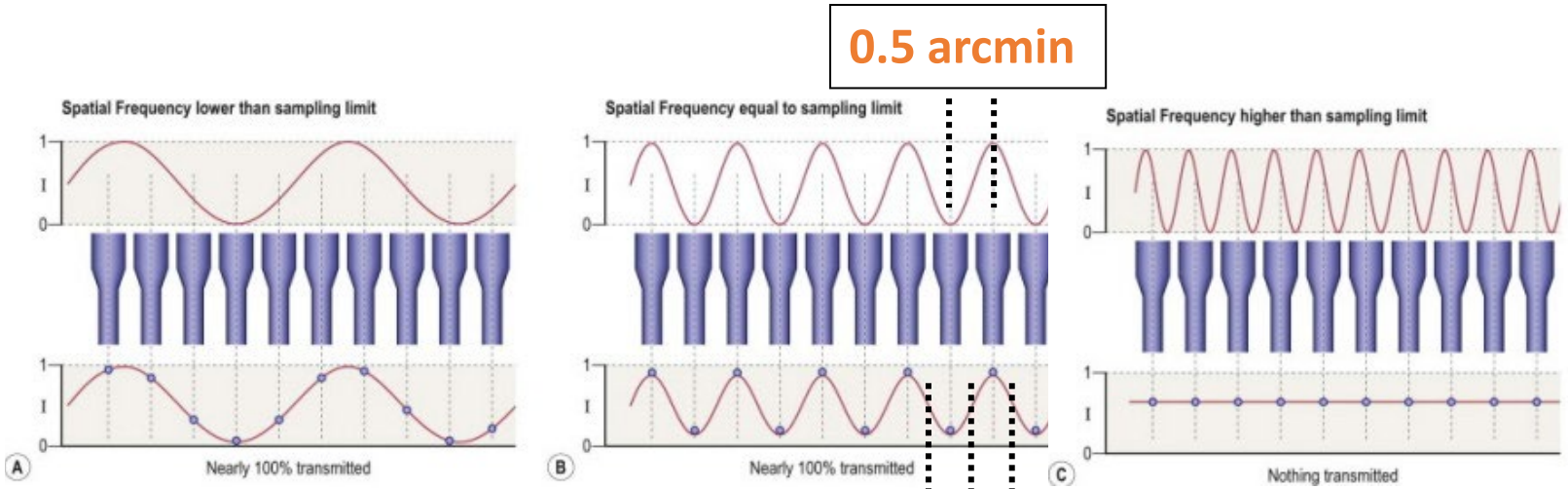
Visual Acuity 1

- Minimum Resolvable Acuity - separation of 2 features

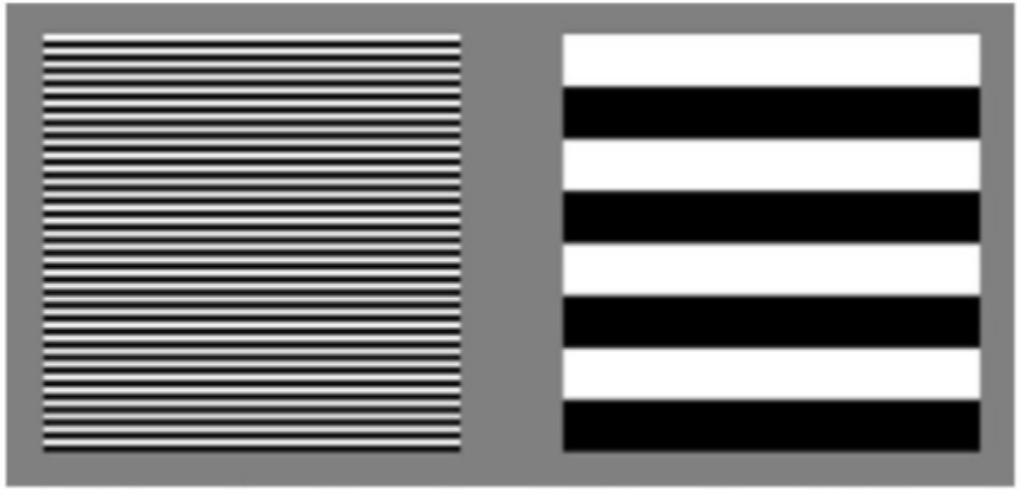
The finest high contrast detail visible, for width of light and dark bar of a grating,
Limit for humans of about **1 arcmin** (0.017 deg) for fovea.
Determined by photoreceptor sampling



Nyquist Limit-
spatial period
2x the cone spacing

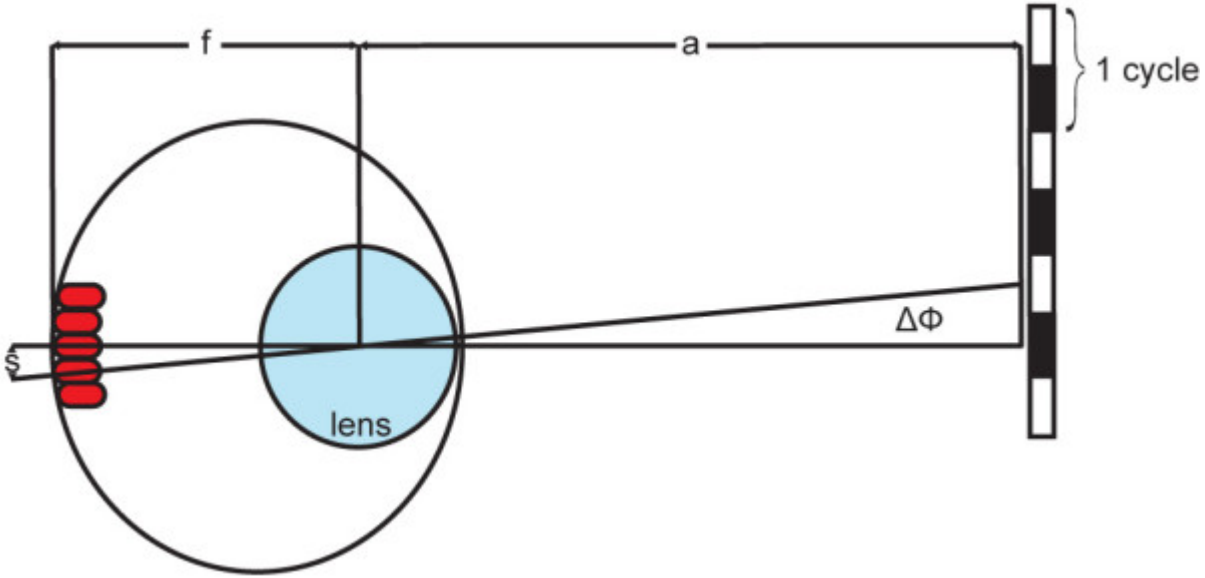
60 cycles per degree grating

Trigonometry!



HSF grating (6 cpd)
Detailed information

LSF grating (0.75 cpd)
Global information



Visual Acuity 2

• Minimum Recognizable Acuity - angular size of the smallest Feature that one can recognize or identify

Snellen Chart

A person with 20/20 vision can see what an average individual can see on an eye chart when they are standing 20 feet away

In contrast, 20/40 (or 6/12) vision means that a person who is 20 feet (6 metres) away from an eye chart can only read the same-sized letters that someone with 20/20 vision can read from 40 feet (or 12 metres) away

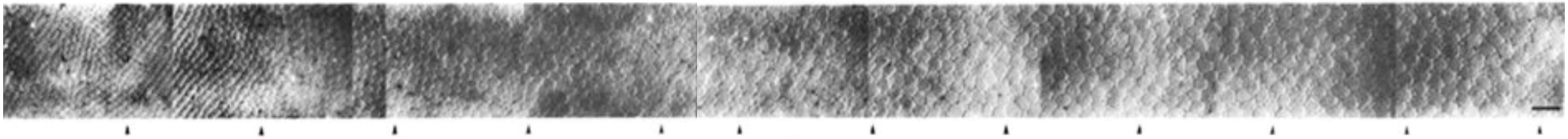
Visual Acuity 3

• Minimum Discriminable Acuity - angular size of the smallest *change* in a feature (e.g., position) that one can identify.
Vernier acuity is termed a *hyperacuity,* limit of **3 arcsec** (0.0008deg).

This is 10 times smaller than width of a foveal cone. Optics of eye spread out the photons, and the information to distinguish A from B is present, but it must be cortical neurons that interpolate this information with high resolution.

What Limits Visual Acuity?

Photoreceptor Spacing –
photoreceptors are densely packed in a triangular array, with foveal cones spaced about **0.5 arcmin**, so Nyquist sampling limit is 1 minute = 60 cpd.



fovea periphery

Cone to ganglion cell convergence:

Fovea: 1 cone ->1 ganglion cell
Periphery: many cones -> 1 ganglion cell

Content taken from: http://www.mcgill.ca/mvr/resident/